An empirical model for assessing the effect of ports' and hinterlands' characteristics on homeports' potential

The case of Mediterranean ports

Spyros Niavis
Research Unit of Environment and Spatial Planning, Department of Planning and Regional Development, University of Thessaly, Volos, Greece, and
Georgios Vaggelas
Department of Shipping, Trade and Transport, University of the Aegean School of Business, Chios, Greece

Abstract

Purpose – The significant benefits associated with cruise tourism have mobilized port industry, as progressively, a large number of ports are developing cruise operations. Although increasing cruise traffic is a major goal for cruise ports, homeporting constitutes a strategic target of the majority of ports due to its greater economic benefits for both the port itself and its hinterland. The establishment of homeport traffic in a cruise port is subjected to a variety of port internal and external factors. Taking these into account, the paper aims at defining elements that affect the potential of a cruise port to become a homeport.

Design/methodology/approach – A sample of 47 Mediterranean ports is selected to form the basis for the implementation of an ordinal regression model which links the likelihood of ports to attract homeport traffic with seven explanatory variables which emerged from relevant literature and are split in the main categories of ports' and hinterlands' characteristics. To fit the model into the paper's data, ports are divided into three categories based on their homeport cruise traffic.

Findings – The results of the empirical model signify that both internal and external factors affect the potential of a port to become a cruise homeport. Concerning the internal factors, adequate infrastructure allowing the facilitation of the last generation of cruise ships and the presence of a private enterprise in ports' operation seems to foster homeport traffic. Additionally, efficiency in operations seems to be a crucial element. On the other hand, the connectivity of port's; hinterlands, tourist infrastructure and the level of economic growth are proved to be the hinterlands' elements which increase the likelihood of a port to attract additional homeport traffic.

Practical implications – The model forms a comprehensive evaluation basis for whether a cruise port should intensify its pursuit of homeport traffic, as the estimated coefficients could support port and local authorities to understand their competitive position against other ports and spot their strengths and weaknesses.

Originality/value – The paper contributes in the research dealing with the identification of crucial elements of homeporting from the port's point of view. Although, it should be mentioned that previous efforts targeting on revealing the characteristics affecting the homeporting potential of ports mostly have been

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based on questionnaires and expert judgements or empirical models in which the total – and not the homeport traffic – was used as the dependent variable. With the proposed empirical model, home-porting choice analysis is transferred, on the one hand, from the stated preferences level to the revealed preferences level and, on the other hand, from an indirect to a direct approximation of the issue.

Keywords Mediterranean, Data envelopment analysis, Ordinal regression, Cruise, Homeport

Paper type Research paper

1. Introduction

The worldwide cruise industry, after a long period of high growth rates, especially during the decade 2001-2010, seems to have passed to a period of normality. More precisely, the annual change in bed capacity between 2014 and 2015 reached 3.7 per cent, while the change in passenger volumes was about 3.2 per cent (Cruise Market Watch, 2016). The cruise market is indeed characterized by oligopolistic structure as, at the end of 2014, five cruise companies or groups of cruise companies controlled a fleet of 175 cruise ships with a total capacity of 424,014 beds which equals to 50.43 per cent of the global fleet and the 89.95 per cent of the global capacity (Odo Maritime and Cruise Business Review, 2014; Vaggelas and Pallis, 2016).

As it is expected, the concentrated structure of cruise market and the need of filling up the new capacity will result in a fiercer competition among cruise companies, which also affects the port industry as new destinations have emerged. As far as Mediterranean Sea is concerned, typical examples of emerging destinations are the port of Brindizi where the increase in cruise passengers traffic was 433.3 per cent during the period of 2010-2015 and the port of Chania (+739.4 per cent during the same period) (Medcruise, 2016).

Competition is also increasing among cruise ports seeking to establish homeport operations, i.e. becoming the starting and/or the ending point of a cruise itinerary. Homeporting is associated with higher economic benefits both for the port itself but also for the port-city (i.e. the destination), in comparison with the respective benefits derived from transit calls (CLIA, 2015). The target of establishing a homeport traffic is subject to a variety of port internal and external factors (Lekakou *et al.*, 2009). The potential of becoming a homeport is highly related to the port's ability to provide the most comprehensive services to cruise ships, their crews and passengers, as well as to the ability of the port's hinterland to ensure that cruise-related activities, such as the accommodation of passengers, the provision of cruise ships supplies and inland transportation are also adequately provided (Ma *et al.*, 2015). Apart from these factors, the geographical position of a cruise port in relation to others is also playing a significant role in liners' decisions (McCalla, 1998).

Taking the aforementioned into account, the target of the present paper is to shed a light on ports' internal and external factors affecting their homeporting potential. A sample of 47 Mediterranean ports are selected to form the basis for the implementation of an empirical model which links the likelihood of ports to attract homeport traffic with seven explanatory variables, emerged from relevant literature. The rest of the paper is organized as follows. In Section 2, a literature review primarily focuses on research dealing with cruise homeports. In Section 3, the conceptual model and the variables employed are presented. In Section 4, the setting of the empirical model and the descriptive statistics of the variables are presented and analyzed in detail. The results of the model and several policy implications that can emerge are highlighted in Section 5.

The final section discusses the major conclusions and the revelation of critical aspects that can be considered as future research objectives.

2. Literature review

Cruise emerges as a hybrid form of tourism and transportation. The supply and demand of the cruise product are subjected to individual and strategic choices of several actors, both at local and global scale (Ma *et al.*, 2015; Pallis, 2015). The basic actors of cruise industry and their interactions are presented in Figure 2. There are three basic interacting players within the cruise circuit. The individuals – byers of cruise trips, the cruise liners who plan and offer the cruise trips and the destinations which are composed by the ports and their hinterland.

As far as customers are concerned, their participation in a cruise is a decision based on behavioral and emotional factors (Hung and Petrick, 2011). In addition to the motivational incentives leading an individual to purchase a cruise package, the final choice is formed by his/her perspectives and decisions regarding several characteristics of the selected cruise. The duration of the trip, the cruise ship and its amenities, the cost of the cruise and the destinations included are among the most important choices that individuals are facing to reach their final choice. These individual preferences are highly taken into account by cruise companies in their effort to provide the most attractive choices among those offered by all cruise liners (Qu and Ping, 1999; Henthorne, 2000) (Figure 1).

Besides offering an attractive cruise package to their customers, cruise liners are also concerned about preserving a high quality regarding their services provision and maintaining a low operational cost. Having the on-board services under their full control, the risk of losing in cruise packages' quality mainly lies on the destinations side; thus, they must fulfill several conditions to be included in cruise liners' itineraries (Lekakou *et al.*, 2009; Rodrigue and Notteboom, 2013).

The aforementioned stress out that destinations are dealing with a composite demand function. Their potential for attracting cruise traffic is subjected to both

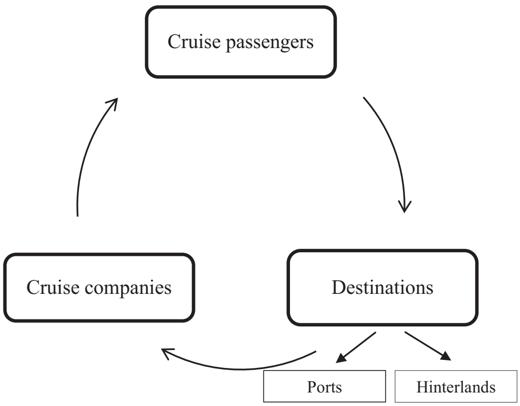

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Figure 1.
Cruise industry actors' network

passengers' and cruise liners' choices. For a destination to be integrated into a cruise network, it has to fulfill a range of prerequisites both at the port's and at the hinterland's side. These prerequisites are varying depending on the type of cruise traffic that the destination facilitates. Thus, for a port of call, the hinterland is playing the most crucial role, as it is its tourism attractiveness that generates the demand for visits. On the other hand, the demand for homeporting activity is subjected to both ports' capacity and hinterland attractiveness. This means that the demand of ports of call is mainly generated by cruise passengers, and the demand for homeports is driven by both cruise passengers and cruise liners (Ma *et al.*, 2015).

Taking into account the aforementioned, for a port to realize its full potential for cruise homeporting, both its internal characteristics as well as the characteristics of its direct hinterland should be analyzed in an integrated context. The literature of cruise ports attractiveness is rich in studies seeking to reveal the characteristics of destinations that influence and finally shape the attractiveness of each port. However, the number of studies exclusively targeting at the homeporting potential is rather limited. Within the scope of the present paper, previous research is classified into two categories. In the first category, studies which focus on general traffic are presented, while in the second category, the studies which focus on homeport traffic are cited and analyzed.

As far as the studies of the first category are concerned, McCalla (1998) first attempted to assess the factors affecting the attractiveness of ports for cruise tourism. Factors were split into site and situation categories. Port attributes, port and cruise ship services and city amenities were forming the site characteristics of destinations, while the sea, land and air connections and regional attractions were forming the category of situation factors. Based on a questionnaire filled in by 30 port authorities, the author concluded that situation factors seemed to be more important for cruise ports' attractiveness. However, the result could not be validated by the paper's data, as differences were considered as minor.

Additionally, Gabe *et al.* (2006) and Miriela and Lennie (2010) used logistic regression models where the likelihood of revisiting Bar Harbour and Curacao, respectively, was modeled as a function of several destination's attributes. Frequency of visits and length of stay at the port are the attributes which have been confirmed by both studies as having a positive effect on passengers' willingness to revisit the destinations.

Andriotis and Agiomirgianakis (2010) used a factor analysis to model the satisfaction perceived by visitors in Heraklion city. Pre-visiting expectations and post-visiting experiences were assessed to extract satisfaction measures. Wang *et al.* (2014) has also based on factor analysis and identified four composite factors which are affecting the cruise traffic of ports. These factors are related to cruise terminal facilities, natural environment of the hinterland, tourism attractions and the overall connectivity levels of destinations. Moreover, Silvestre *et al.* (2008) and Blas *et al.* (2014) relied on structural equation models to assess the satisfaction of visitors at Acores and Valencia, respectively. Silvestre *et al.* (2008) results assigned a great weight on tourism attractions among the factors with the highest effect on visitors' intention to revisit Acores. Additionally, city's infrastructures and atmosphere and tourist attractions came out to be the most important factors of revisiting a destination within the study of Blas *et al.* (2014).

Kim *et al.* (2012) ran different regression and correlation models to assess the effect of several factors on the image perceived by passengers regarding the destinations they have visited and how this perception may affect their intention to revisit them. Additionally, Brida *et al.* (2013) relied on correspondence analysis and a further cluster analysis to classify visitors of Cartagena port according to personal characteristics and their perceptions regarding several attributes of the itinerary. Finally, Castillo-Manzano *et al.* (2014) ran an ordinary least squares regression model to assess, in an empirical way, the effect of site and situation attributes on the potential of ports to attract cruise traffic. The authors concluded that various hinterland characteristics such as insular situation, hotels capacity, air connectivity and population are positively affecting cruise traffic.

As far as homeports' potential is concerned, the paper of Lekakou *et al.* (2009) can be regarded as a stimulus paper for further research related to this issue. Based on a questionnaire filled in by different stakeholders of cruise industry, authors have managed to assign weights on different site and situation factors related to the homeporting capabilities of cruise destinations. The authors concluded that, although site and situation characteristics are of the same importance, several partial factors such as airport connection and political and security conditions of the destinations seem to play a more crucial role in homeports' selection by cruise companies.

Additionally, Ma *et al.* (2015) have used a grey-cloud clustering model to evaluate the potential of nine Asian ports in becoming cruise homeports using quantitative and qualitative factors. Different data sources were used for quantitative factors, while experts' judgements were used to evaluate the ports' records regarding the qualitative factors. Finally, the results of grey-cloud clustering were used to classify ports as homeports and ports of call.

Finally, Esteve-Perez and Garcia-Sanchez (2015) evaluated the potential of Spanish ports in becoming homeports for Mediterranean cruises. The authors used factor analysis and an ordinary least square statistical model to measure the effect of several factors on cruise traffic observed at ports. The main factors were related to hinterlands' attractiveness, ports' infrastructure and ports' pricing policies. The overall cruise traffic was used as the dependent variable of the regression model.

As the literature review revealed, the issue of homeports attractiveness is yet to be extensively covered by the academia. The rather limited existing studies on homeport attractiveness and potential are based mainly on the fragmented examination of decisive parameters, while others are based on questionnaires to market players or qualitative expert judgement, paying less attention to empirical research on cruise ports. Additionally, the only empirical study (Esteve-Perez and Garcia-Sanchez, 2015) using a statistical model to link cruise traffic with ports' parameters did not use homeport traffic as the dependent variable of the model but instead incorporated a variable depicting the total traffic of ports in which transit passengers are included as well.

The paper tries to fill these gaps by building upon existing research findings, namely, the parameters of homeporting attractiveness and through the development of an ordinal regression model provides an integrated perspective as regards the importance of each parameter. Moreover, the use of data from cruise ports in the Mediterranean region, the second most important cruise area in the world, gives an added value to the research, as it interconnects research and industry. The outputs have also practical value for cruise ports and especially for the cruise ports that are included in the research sample because they can be incorporated in the strategies developed be each homeport.

In Section 3, the conceptual model as well as the variables selected for the homeport attractiveness analysis are presented and analyzed.

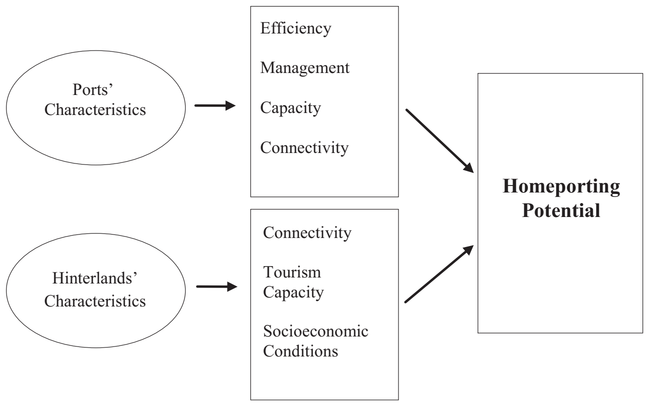
3. Model specification and description of variables

3.1 Conceptual model

The paper aims at the identification of the factors affecting the homeports' choice by using an empirical model which relies on actual data of Mediterranean cruises. Therefore, based on real observations, home-porting choice analysis is transferred, on the one hand, from the stated preferences level to the revealed preferences level and, on the other hand, from an indirect to a direct approximation of the issue. The conceptual model of the present paper is presented in Figure 3. The factors are split in two basic categories. The first category refers to ports' characteristics and the second to hinterlands' characteristics. The specification of the dependent variable as well as of the independent variables adapted to criteria of Figure 2 is conducted below.

3.2 Description of variables

3.2.1 Dependent variable. As it is already mentioned, the empirical model focuses on the relationship between homeport traffic and destinations' attributes. Taking into account the significant benefits of homeporting, the basic assumption of the paper is that all ports would seek in becoming a homeport. Not all the Mediterranean cruise ports have been included into the sample, as a threshold of 10,000 annual cruise passengers' throughput has been set to ensure that ports of the sample are already providing cruise services. To overcome the difficulties arising from the fact that several ports have no homeport traffic and at the same time to avoid using data referring to total cruise traffic (transit and homeport) which may lead to misleading results, ports are classified in three different ranking categories according to their annual homeport traffic, and an ordered logit model is used to test the effect of various destinations' attributes on homeports' potential. Additionally, to overcome the unstable political situation of many south Mediterranean countries, the observations refer to 2010, as this was a year where cruise liners' and passengers' selections have not been substantially affected by the unstable political conditions. The three categories of ports are presented in Table I.



Source: Authors

Figure 2. Conceptual model of homeports attractiveness

3.2.2 Independent variables

3.2.2.1 Ports' characteristics

3.2.2.1.1 Port efficiency. Efficiency in providing port services is recognized as one of the most crucial aspects in port industry (Niavis and Tsekeris, 2012). The term efficiency is referring to the capability of ports to "do things right" (Brooks *et al.*, 2011). While efficiency analysis has been studied by a significant number of scholars, this is not the case for cruise ports (Di Vaio *et al.*, 2011). Nevertheless, from the few studies focusing on the efficiency of cruise ports, it is becoming evident that the efficient use of ports infrastructures enhances their competitive position within the cruise market.

More precisely, McCalla (1998) denotes that the existence of efficient terminals is a prerequisite for a port to become a homeport. Additionally, Lekakou *et al.* (2009) and Di Vaio *et al.* (2011) have managed to show that efficiency and infrastructures' characteristics are among the most important factors affecting the decision of a cruise company for the selection of a homeport. Based on the previous finding, Di Vaio *et al.* (2011) assessed the technical efficiency of 14 Italian cruise terminals for the years 2004-2006 by using an output oriented distance function within the concept of stochastic frontier analysis (SFA). By using land and infrastructural characteristics of terminals as inputs and the total home and transit traffic as outputs, researchers found great variations at the technical efficiency levels of the terminals under evaluation.

The paper uses a similar method, data envelopment analysis (DEA), to form the methodological framework for technical efficiency evaluation. The major difference of DEA and SFA is that the first is a non-parametric evaluation method, while the second is based on strong assumptions (Niavis and Tsekeris, 2012). As little effort has been devoted in defining a production function for the cruise terminal operations, using SFA in the present paper could result in extracting inaccurate results. For this reason, DEA is preferred for conducting the efficiency estimations.

Regarding the orientation of the model, taking into account that ports seek to expand homeport traffic, the output-oriented DEA model is applied within the present paper, as this form of model is most appropriate when output maximization is at the core of port authorities' strategies (Wang *et al.*, 2003; Di Vaio *et al.*, 2011). That is, cruise ports based on their existing infrastructure and land capital seek to maximize the amount of cruise ships or passengers' flows. Regarding the variables representing the inputs of each port, the total berths' length and the total number of passenger terminal in operation at each port are chosen. The first variable is considered as a land input and the second as a variable that measures ports infrastructures' adequacy. Regarding the output of the model, the total number of cruise ships facilitated by each port is selected. By selecting the total cruise ships facilitated by the port and not the total passengers as the output of the model, the differences of operations' scale among the ports are omitted. Thus, a small port could accommodate the same number of cruise ships with a larger one and use its

Table I.
The three categories of the dependent variable

Category	No. of cruise passengers
Zero or low homeporting throughput	0-30,000
Medium homeporting throughput	30,001-200,000
High homeporting throughput	>200,000

infrastructures in an efficient way, albeit the cruise ships calling at the two ports may considerably differ in size and carrying capacity in terms of passengers.

Taking the aforementioned into account, the technical efficiency of $port_0$ is evaluated with the use of equation (1). A fully efficient port will acquire an efficiency score of 1, while inefficient ports will acquire efficiency scores above 1:

$$
\begin{aligned}
&\max \varphi \\
&\text{s.t.} \sum_{j=1}^{n} len_j \lambda_j \le len_0 \; j = 1, \dots, 47 \\
&\sum_{j=1}^{n} ter_j \lambda_j \le ter_0 \; j = 1, \dots, 47 \\
&\sum_{j=1}^{n} tsh_j \lambda_j \ge \varphi^* tsh_0 \; j = 1, \dots, 47 \\
&\lambda_j \ge 0,
\end{aligned}
\tag{1}
$$

where:

len = the total berth length of ports expressed in meters;
ter = the number of passenger terminals operating at each port;
tsh = the total number of ships serviced by each port in year 2010;
λ_j = the decision variables which represent the weights $port_j$ would place on $port_0$ in constructing its efficient reference set; and
φ^* = the decision variable which represents the relative technical efficiency of $port_0$.

3.2.2.1.2 Type of management. Undoubtedly, an increasing involvement of the private sector in the global port industry is evident (Notteboom *et al.*, 2012). Concerning the involvement of private sector in passenger and cruise ports, this has been intensified in the past few years. In the cruise sector, those who are mainly concerned about investing in cruise terminal operations are the cruise companies (Pallis, 2015). This vertical integration of cruise companies is associated with substantial gains mainly concerning the cost minimization, overcoming capacity constraints, flexibility in operations and product unification (Gui and Russo, 2011).

Additionally, the involvement of private actors in terminal operations is believed by many scholars to be also beneficiary for the port itself. Public authorities seek to grand port terminal(s) to private company(ies), as this dissociates the public authority from the costly and risky investments connected to cruise port infrastructures' and operations' expansion (Gui and Russo, 2011; Pallis, 2015). Within the scope of the paper, a dummy variable is developed to evaluate the impact of private involvement on the potential of ports to attract homeport traffic. The variable equals to one (1) if the port is exclusively managed by a public authority and equals to two (2) when a private actor is involved in the cruise terminal, either as an exclusive operator or as a partner.

3.2.2.1.3 Berth of 350 m. As cruise industry is expanding, the need to achieve economies of scale and provide a large number of on-board options to passengers has been the main driving factor for the construction of mega cruise ships (Rodrigue and Notteboom, 2013). These developments have remarkably affected the port industry. Large-scale infrastructure renovations, terminal expansions and dredging works are essential for various cruise ports seeking to sustain and/or expand their cruise traffic volumes. With an average length for a cruise ship of 200 meters and the fact that the recently delivered "Allure of the Seas" of Royal Caribbean International is 362 meters in length, it is becoming evident that a modern cruise port aiming at facilitating homeport traffic has to provide at least one berth exceeding of 350 meters (Pallis, 2015). As such, a dummy variable equals to two (2) for ports owning a berth over 350 meters and one (1) for others is incorporated into the model.

3.2.2.1.4 Ports connectivity. Apart from their capacity in facilitating cruise ships and the related operations in an adequate level, cruise ports with potential for attracting homeport traffic may also be affected by their relevant position against global and regional cruise networks. The connectivity of each cruise port is established on two basic pillars. The first pillar has a geographical dimension which is shaped by the physical position of the port. A position near to other cruise ports is expected to enhance cruise companies target for cost minimization due to reduced distances among the ports included in their trip loop (Lekakou *et al.*, 2009; Ma *et al.*, 2015). On the other hand, the connectivity of ports has also a managerial dimension which is reflected on the ability of port authorities to establish strong cooperation channels with cruise companies.

The variable selected to quantify the cruise port connectivity is the number of different cruise liners calling at the port. As it is expected, a well-integrated port will cooperate with a large number of cruise companies thus attracting more cruise calls. Then, it is on the ports' capacity and networking capabilities to capitalize this cooperation channels to establish homeporting agreements with cruise operators. The variable takes the form of the number of different cruise companies calling at a cruise port on an annual basis.

3.2.2.2 Hinterlands' characteristics

3.2.2.2.1 Air connectivity index (ACI). Of similar importance to that of ports' connectivity is also the cruise port's hinterland transport connections. Cruise ports which are situated near airports with a variety of international connections are having a competitive advantage in attracting homeport traffic (McCalla, 1998). Lekakou *et al.* (2009) justified that the existence of an airport with adequate international connections at a close distance to a cruise port is among the most critical factors influencing the selection of a homeport by cruise lines. Moreover, a type of cruise that gains popularity is that of fly cruises which are provided as a unified product including the flight expenses to and from the homeport and the cost of the cruise itself. It is estimated that for 2014, more than half of the UK-originated cruise packages was fly cruises, while about 25 per cent of UK tourists choosing a Mediterranean cruise preferred to do it through fly cruise packet (CLIA, 2015). Local authorities are strongly interested in attracting fly cruises, as these come up with greater local economic benefits (Pallis, 2015).

Within the present paper, the variable selected to quantify the air connectivity of the ports is taking the form of the indicator presented below:

$$ACI_i = AT_i / Dis_i \quad i = 1, \ldots, 47 \tag{2}$$

where:

ACI = Air Connectivity Index of port$_i$;
AT = Annual Passenger Traffic of airport$_i$; and
Dis = Distance between port$_i$ and airport$_i$.

As can be seen in equation (2), the annual passenger traffic of the airports is taken as a measure of airports' significance. It is expected that airports with increased international traffic provide more options to cruise passengers to start or end their cruise from an adjacent cruise port than airports with low traffic. Additionally, to better depict the level of accessibility of each port through its pairing airport, the distance between the port and the airport is selected as a weighting factor of ports' air connectivity variable. Thus, the variable is taking its highest prices when busy airports are situated very close to cruise ports.

3.2.2.2.2 Island. A dummy variable is inserted into the estimation model taking the price of two (2) for insular ports and the price of one (1) for the others. Two contradictory forces affect the potential of insular ports to attract homeport traffic. On the one hand, insular ports are less favored in terms of transmodal connections, as these ports cannot be easily connected with other transportation means except for air transport. On the other hand, islands seem to be more attractive, especially in the Mediterranean region, during warmer seasons. This is testified by the findings of Castillo-Manzano *et al.* (2014) who highlighted the positive relationship between insular itineraries and total cruise traffic.

3.2.2.2.3 Capacity of tourist infrastructure. The capacity of tourism related infrastructure in a destination constitutes, among others, a factor directly affecting its competitiveness. Cruise tourists, are also taking into account the different leisure options provided by each potential port of call (Silvestre *et al.*, 2008; Pranic *et al.*, 2013; Ma *et al.*, 2015). Castillo-Manzano *et al.* (2014) found that there is a strong effect of per capita hotels in each region on the cruise flows to local ports. As far as the selection of homeport is concerned, cruise passengers also seem to take into account similar attributes. Furthermore, these attributes are more important for homeports than for ports of call because tourists are expected to interact in a larger extent with local dinning, entertainment and transportation services providers (Brida *et al.*, 2012). Exploring the annual schedules of the major cruise lines in their Mediterranean trips, it is becoming evident that for popular destinations such as Barcelona, Venice and Istanbul an extra night stay on a cruise ship before or after the trip is often offered. This is because tourists prefer to have more days available to explore the homeport destination. Thus, it is the attractiveness of the city that may affect the choice of cruise lines to start or end a cruise from their ports (Princess Cruises, 2012; Celebrity Cruise, 2015). For the paper's purpose, the number of tourist enterprises (accommodation, bars and restaurants) listed in TripAdvisor is selected to quantify the tourism capacity of homeports' direct hinterland (City level).

3.2.2.2.4 Gross domestic product per capita (pc GDP). Regions with high GDP are expected to provide more choices to cruise companies regarding the purchase of cruise ship supplies such as fuels, food, beverage, water and repair services, mechanical parts, etc. (Pallis, 2015). Due to the tight timeline of cruise schedules, it is of great essence for cruise companies to ensure the undisrupted provision of supplying processes (Véronneau and Roy, 2009). Thus, a region providing a lot of alternatives reduces the risks of interruptions in the supply chains.

Moreover, cruise as a subcategory of a tourism product is tightly connected to economic growth (Lee and Chang, 2008). Regarding the positive effect of economic growth to tourism demand, it is implied that the highest income is translated to the highest tourism demand. Additionally, despite the fact that the costs for a cruise are not so high, mainly due to the achievement of economies of scale by cruise companies, the plethora of options regarding the duration of trips, the class of cruise ships and their provided amenities, the competition among cruise companies is not concentrated only on prices. Thus, the cruise product cannot be characterized as a low cost good (Weaver, 2005; Rodrigue and Notteboom, 2013). Taking these into account, the demand for cruises is expected to be higher at source markets of high economic development. The variable is formulated by using the nominal GDP per capita of 2010 expressed in euros (€).

4. Final model specification and descriptive statistics of variables

4.1 Empirical model

A model formulation involves the selection of the appropriate mathematical model to fit into the data. In this paper, the statistical model of ordinal regression analysis has been chosen. This kind of regression technique comes up with the major advantage of requiring fewer assumptions compared with the multiple linear regression, as it does not assume that the response variable and the error terms are distributed normally (Norusis, 2004; Minetos and Polyzos, 2010).

Ordinal regression is a form of the – so-called – generalized linear models. The categories of the response variable are formulated in an ordered sense, and the focus goes on the cumulative odds and not on simple odds as in logistic regression models. Thus, the explanatory variables, through a linear combination, are used to predict the odds of a port to lie at or above a single threshold of the ordered response variable. These thresholds are extracted through maximum likelihood estimations and, as the estimations are based on the actual data, a link function to set the thresholds is required. The link function selection is subjected to the escalation of the response variable's cumulative probability (Norusis, 2004; O'Connell, 2006; Minetos and Polyzos, 2010). By examining the observations of the ports' sample, it can be extracted that the majority of ports are falling in the first category of homeport traffic. That is, the cumulative probability of the response variable is higher for the lower categories. Thus, the negative log-log link function is selected for the present ordinal model. The negative log-log link takes the form $link(y_{ij}) = \ln(-\ln(1-y))$. Taking into account the aforementioned, the final form of the model used by the paper is written as follows:

$$\begin{aligned} link(\theta_j) = a_j - \beta_{Eff} * Eff - \begin{pmatrix} \beta_{ToM-1} \\ \beta_{ToM-2} \end{pmatrix} * \begin{pmatrix} ToM-1 \\ ToM-2 \end{pmatrix} \\ - \begin{pmatrix} \beta_{D350-1} \\ \beta_{D350-2} \end{pmatrix} * \begin{pmatrix} D350-1 \\ D350-2 \end{pmatrix} - \beta_{ACI} * ACI - \beta_{PC} * PC \\ - \begin{pmatrix} \beta_{DIsl-1} \\ \beta_{DIsl-2} \end{pmatrix} * \begin{pmatrix} DIsl-1 \\ DIsl-2 \end{pmatrix} - \beta_{CoTI} * CoTI - \beta_{GDP} * GDP \quad j = 1,2 \end{aligned} \tag{3}$$

where:

$link$ = the link function;
θ_j = the cumulative probability for the jth category;
a_j = the threshold for the jth category; and
β = the regression parameters to be estimated.

4.2 Descriptive statistics of variables

In total, 47 cruise ports are included in the sample and were selected on the basis of data availability, and their annual cruise traffic (homeport and transit) was set with a threshold of 10,000 passengers.

As far as the dependent variable is concerned, the main descriptive statistics concerning the whole sample and its subcategories are presented in Table II which shows that 28 of the cruise ports are presenting zero or low homeporting traffic, 8 cruise ports lie in the medium homeporting category, while 11 cruise ports are presenting a very high homeport traffic. The highest homeport passenger throughput is exceeding 1.25 million, while the average homeport traffic for the sample is around 162,000 passengers.

Regarding the efficiency of ports, the variables used to estimate their technical efficiency are presented in Table III. As can be seen, the average berths length of the sample ports is 1,972 m. However, remarkable differences are observed among ports as the minimum length of berths is 260 m (Kefalonia) and the maximum is 11.500 m (Naples). As far as passenger terminals are concerned, the average sample port is operating two cruise terminals[1]. Nevertheless, there are many ports that still do not have a terminal dedicated to cruise passengers. The maximum number of terminals is found at the ports of Barcelona and Venice where 8 and 7 terminals are existing, respectively. Finally, in 2010, an average of 269 ships called at the ports of the sample. The lowest number of ships called at Alanya port (30) and the highest at Civitavecchia (900).

The results of the DEA model highlight the lack of efficiency at Mediterranean cruise ports, as the output efficiency is estimated at 3.94. Nevertheless, as the standard deviation of the results is higher than the mean, it is becoming evident that a great variability in efficiency estimations exists. The efficiency levels of cruise ports are

	Category			
Measures	Low	Medium	High	All
No	28	8	11	47
Mean	3,149	74,245	632,690	162,590
Standard	7,905	28,625	398,819	324,959
Minimum	0	44,795	164,238	0
Maximum	29,362	114,657	1,265,613	1,265,613

Sources: Authors elaboration based on data from MedCruise (2011, 2014); Port Authorities websites

Table II. Descriptive statistics of dependent variable

	Variables			
Measures	Length	Terminals	Ships	Efficiency
Mean	1,972	2	269	3.94
Standard	2,168	2	233	4.28
Minimum	260	0	30	1.00
Maximum	11,500	8	900	21.36

Sources: Authors elaboration based on data from MedCruise, (2011, 2014); Port Authorities websites

Table III. Descriptive statistics of DEA input and output variables presented in more detail in Figure 3. At the upper map of the figure, the efficiency of western ports is presented, while the efficiency levels for eastern ports could be seen at the lower map. There are seven fully efficient ports in total. At the western part of the Mediterranean, the most efficient ports are Barcelona (Spain), Nice (France) and Civitavecchia (Italy), and at the Eastern part, the Greek ports of Piraeus, Katakolon and Kefalonia, the Croatian port of Dubrovnik and the port of Izmir port in Turkey. These ports use their inputs in the best possible way toward the facilitation of cruise ships.

On the other hand, Volos (Greece), Alanya (Turkey) and the two Spanish ports (Alicante and Almeria) are regarded as the least efficient cruise ports of the sample. Inefficient ports are dealing with problems of inputs excess or lacking of output. These input and output slacks should be seriously considered by ports in their effort to attract more cruise traffic. This is because when production factors are not fully used,

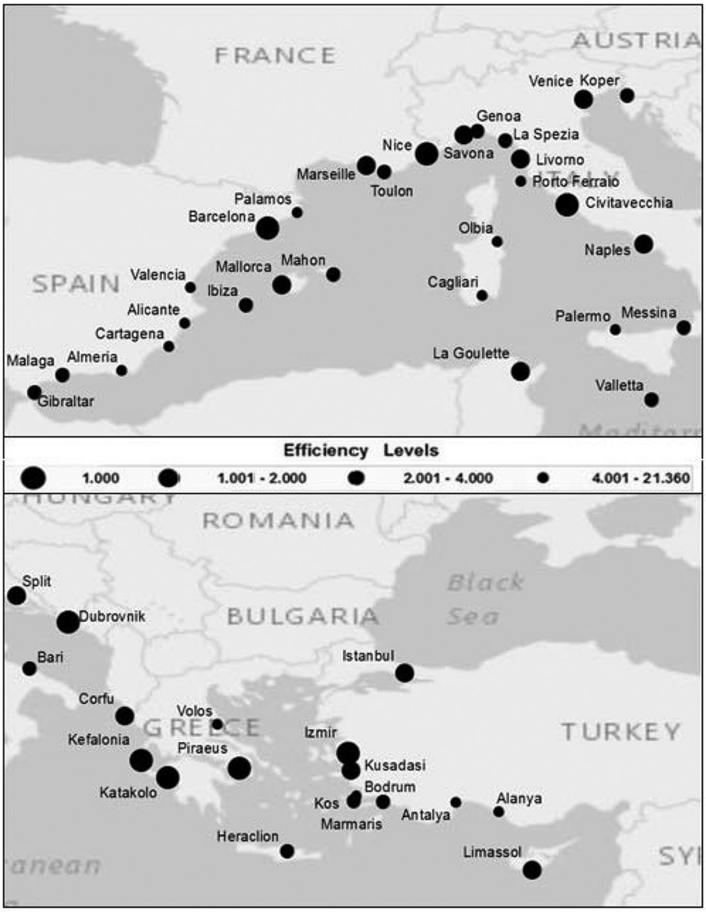


Figure 3.
Efficiency levels of Mediterranean cruise ports

Source: Authors elaboration

opportunity costs arise. These costs are very important for the port industry due to the significant investments costs that are associated with ports' development.

Additionally, in Table IV, the descriptive statistics of the other variables are presented. As it is becoming evident, the average number of cruise companies calling at the ports of the sample is 12. Regarding GDP per capita, although the variability of the observations is not so high, there still seems to be a great difference among the growth level of the ports' hinterlands. These differences are mainly observed among EU and non-EU ports. Additionally, the values of the ACI index present significant variations among ports. Thus, the highest value is exceeding 4 million pax/km, while the lowest is just exceeding 1,000 pax/km. Significant differences are also observed at the capacity of tourist infrastructure within ports' direct hinterlands. Although the average number of tourist establishments published on TripAdvisor is 225 for each port, there are ports, such as Katakolon and Gibraltar, whose hinterlands have less than ten tourist establishments and ports such as Mallorca where more than 1,000 tourism-related enterprises are listed in TripAdvisor. Finally, as far as the dummy variables are concerned, 14 ports are conducting cruise operations through or with the cooperation of private actors, 15 ports are having at least one berth whose length exceeds 350 m and 14 ports of the sample are situated at insular regions.

4.3 Results

In Table V, the results of two basic tests about the goodness of fit of the present model to the sample ports' data are presented. The first test is conducted to check the null assumption that the location coefficients for all of the predictor variables in the model are zero. The significance level of the estimation which is lower than 0.01 ($p < 0.01$) leads us to the rejection of the null hypothesis. Thus, we draw the conclusion that the intercept-only model does not perform better than the model with the predictors. The second test is the test of parallel lines which is conducted to check whether the regression coefficients are equal for all corresponding outcome categories when ordinal regression is implemented. If this assumption is violated, then the multinomial logistic regression model can be used as an alternative model. As it is seen in Table V, the assumption of parallelism cannot be rejected because the level of statistical significance for the general model is 0.605. Therefore, we cannot reject the null hypothesis that the location parameters are the same across the response categories. Finally, it should be noted that the pesudo-R^2 measures also yield quite satisfactory results.

	Variables							
	Numeric				Dummy			
Measures	Cruise port connectivity	GDP pc.	ACI	Capacity of tourist infrastructures	Value	Type of management	D350m	Island
Mean	12	18,768	432,207	225	2	14	15	14
Standard	6	7,827	678,941	290				
Minimum	1	3,174	1,042	4	1	33	32	33
Maximum	23	31,991	4,172,791	1,263				

Sources: Authors elaboration based on data from MedCruise (2011, 2014); Eurostat (2013); TripAdvisor (2011); Port Authorities websites; Cruise Critic (2011)

Table IV. Descriptive statistics of independent variables

5. Results and discussion

The results of the ordinal regression model are presented in Table VI. The estimated coefficient of the "Efficiency" variable is negative and statistically significant at the 0.10 level. This estimation implies that as inefficiency decreases the potential of a port to attract more homeport traffic is increasing. This result empirically testifies the relevant findings of Lekakou *et al.* (2009) who identified a willingness of cruise companies to cooperate with more efficient cruise ports for setting up homeport operations. The estimation for the "Type of Management" coefficient is also negative and statistically significant at the 0.01 level. As the negative estimation is assigned to the category of public ports, the estimation leads to the conclusion that cruise ports, where private actors are present, are more likely to lie at the higher categories of homeport traffic.

The estimation of the "D350" coefficient is also negative and statistically significant at the 0.05 level. This outcome highlights the crucial role of ports infrastructure capacity in pursuit of homeport traffic. This result is in line with the findings of Lekakou *et al.* (2009) and Ma *et al.* (2015) who also found that adequate infrastructure of ports are a factor seriously taken into account when cruise companies develop their cruise programs. The existence of a berth with an adequate length will acquire an even greater importance as the size of the cruise ships is getting bigger. Finally, the coefficient estimation for the variable "Ports' Connectivity" is also negative and statistically significant at the 0.10 level. This quite unexpected estimation implies that cruise ports that are cooperating with a small number of cruise companies have a higher probability to attract homeport traffic than cruise ports which are called from a relevant high number of cruise liners. This finding can be potentially attributed to the dominant role that some cruise companies have in the Mediterranean through their participation in the management of cruise terminals.

Additionally, the estimation of the "ACI" coefficient is positive and statistically significant at the 0.01 level. This result verifies the findings of Lekakou *et al.* (2009) and Ma *et al.* (2015) regarding the importance of airport's existence in attracting homeport traffic. The estimation for the "Island" variable lacks of statistical significance. Thus, no safe conclusions can be extracted on whether insular ports overweigh mainland ports in attracting homeport traffic.

A significant influence on homeporting potential is also found for the variable "Capacity of Touristic Infrastructures", as the relevant estimation is positive and statistical significant at the (0.05) level. The tourist capacity of ports' hinterlands seems to foster cruise port's attractiveness and improve its competitive position. The result

Model	–2 Log likelihood	Chi-square	df	Sig.
Model fitting information				
Intercept only	89.286			
Final	38.007	51.278	8	0.001
Test of parallel lines				
Null hypothesis	38.007			
General	31.626	6.381	8	0.605

Link function: negative log-log

Source: Authors elaboration

Table V. Goodness of fit tests results

Table VI. Results of ordinal regression on ports' sample

Coefficient		Categories	Estimation	Standard error	Wald	Significance
		Threshold				
δ_1		Low homeport traffic	−0.340	1.507	0.051	0.821
δ_2		Medium homeport traffic	1.682	1.650	1.039	0.308
		Location				
Coefficient	Category	Variables	Estimation	Standard error	Wald	Significance
β_{Eff}	Ports' characteristics	Efficiency	−0.402	0.243	2.733	0.098
β_{ToM-1}		Dummy type of management	−2.993	0.875	11.701	0.001
β_{ToM-2}		Dummy type of management	0.000*	–	–	–
β_{D350-1}		Dummy berth of 350 m	−1.477	0.754	3.839	0.049
β_{D350-2}		Dummy berth of 350 m	0.000*	–	–	–
β_{PC}		Ports' connectivity	−0.122	0.070	3.096	0.078
β_{ACI}	Hinterlands' characteristics	Air connectivity index	0.000	0.000	6.974	0.008
β_{DISl-1}		Dummy island	0.730	0.800	0.833	0.361
β_{DISl-2}		Dummy island	0.000*	–	–	–
β_{CoTI}		Capacity of touristic infrastructures	0.003	0.001	4.126	0.042
β_{GDP}		GDP pc	0.000	0.000	9.813	0.002

Notes: Link function: Negative Log-log; *This parameter is set to zero because it is redundant empirically testifies the findings of Lekakou *et al.* (2009), Castillo-Manzano *et al.* (2014) and Ma *et al.* (2015). Finally, positive and statistically significant at 0.01 level is the estimation for the coefficient of "GDP per capita". This result verifies the implications found in Ma *et al.* (2015) where GDP per capita was evaluated as the most crucial factor regarding the category of market scale and development potential of ports' hinterlands. Thus, it is becoming evident that ports operating in regions of high economic growth are expected to more easily function as homeports than ports operating in less developed regions.

5.1 Discussion and policy implications

Based on the model results, several policy implications could be derived for both port and local authorities. As far as port authorities are concerned, the most important findings could be extracted from the estimations regarding the first category of attributes which are lying under their direct control. Adequate infrastructure allowing the facilitation of the last generation of cruise ships and the presence of a private enterprise in ports' operation seems to foster homeport traffic. Additionally, efficiency in operations seems to be a crucial element directly connected both with the attractiveness of the cruise port but also with the target of cost minimization. However, it should be stressed that operational improvements should not lead to quality reductions regarding the offered services. This means that port authorities should be in a position to provide all the necessary cruise-related services keeping a minimum quality threshold.

Being more specific, smaller ports like Cartagena and Volos provide an ambient berthing space, but they still lack a cruise terminal. These cruise ports are among the most inefficient in the Mediterranean. Thus, despite the fact that they can still accommodate some transit traffic, they will remain ineffective and unattractive for homeport traffic until they realize essential additional infrastructural investments. On the other hand, ports like Livorno and Corfu, despite having adequate infrastructure and operating at quite satisfactory levels of efficiency, are still unable to establish regular homeport operations. The critical question arising from this reality is whether a port should insist on homeporting pursuit by undertaking the appropriate investments or keep cruise at a standard volume and allocate valuable resources at other sectors of port activities.

The above issue should not be partially answered based on individual estimations but on a critical interpretation of estimations as a whole. Thus, it is not only cruise port characteristics that should be taken into account before running investment programs or management changes but also the general conditions of the host region. Figure 4 might provide a valuable input toward this direction. More precisely, based on model estimated coefficients, the cumulative predicted probabilities of the three categories can be extracted for ports of different characteristics. Two hypothetical ports are selected to examine whether investing in cruise activities constitutes a reasonable strategy under different conditions. The first port labeled as Port A is a non-insular port under public management, without a berth exceeding 350 m and all the other attributes lying on samples' means. Additionally, Port B is similar to Port A with the difference being on the hinterland's characteristics. More precisely, the port is assumed to be situated on a region where only 50 tourist enterprises are listed in TripAdvisor, the air connectivity is rather low (50,000 Pax/km) and the GDP per capita corresponds to €15,000. As can be seen from Figure 4, Port A presents a probability of 89 per cent to be classified at the

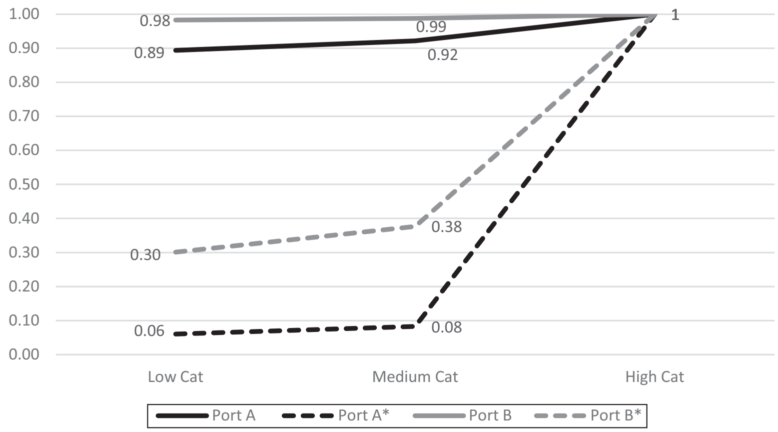


Figure 4. Cumulative predicted probabilities of dependent variable for selected ports

category of zero or low homeport traffic. Moreover, the probability of Port B to be included in the same category is even higher, as it exceeds 98 per cent.

Assuming that ports move toward port modernization or expansion in order to meet the contemporary needs of cruise industry and with the other characteristics remaining unchanged, we assume that both ports grant the management of cruise activities to a private company, which constructs a new berth of 350 m. for cruise activities and manages to decrease inefficiency by one unit (2.94). The new cumulative probabilities of the three categories are presented under the labels Port A* and Port B*. As can be seen from Figure 4, Port A* now presents only 6 per cent probability to be classified at the lower category and 92 per cent probability to be classified at the higher category. In addition, Port B* has also increased its probabilities to establish a homeport base but it still presents 30 per cent probability of remaining at the lower category. Thus, based on the present attributes it is concluded that investment risk is higher for Port B.

What is becoming evident from the two previous port examples is that the risk entailed in ports' investments should be extensively evaluated by port authorities. Evaluating the risk means that all internal and external port's characteristics as well as the port and the market dynamics should be recorded and assessed. On the other hand, local authorities should not stay passive at this challenge. Increasing the connectivity of the region, participating in globalized city networks, improving regional infrastructure, developing integrated coastal zone management plans and establishing a cooperation channel with the local port authorities are considered as effective tools to boost homeport traffic. Moreover, especially in areas where tourist potential is high, strategic plans should also include the aim of homeport establishment. The findings of the study directly connect the tourist attractiveness of hinterlands with homeporting potentials. In turn, establishing a homeport may further foster tourism development in the area with high direct, indirect and induced benefits on the local economy.

6. Conclusions

The paper focuses on the cruise industry trying to shed light on the factors affecting the homeport potentials of cruise ports. Two main categories of attributes, ports' characteristics and hinterlands' characteristics were selected to explain the likelihood of cruise ports to become homeports. An ordinal regression model and the observations of 47 Mediterranean ports were used. The fitting of the model on the actual data is considered as quite satisfactory taking into account that all preparatory tests returned the expected results, and the estimated coefficients for most of the variables yielded statistical significance.

The model forms a comprehensive evaluation basis for whether a cruise port should intensify its pursuit of homeport traffic, as it constitutes a methodological tool capable to quantify crucial internal and external port conditions which shape the homeporting potential of cruise ports within a competitive environment. Through the interpretation of results, critical implications derived for both cruise port and local authorities. Improving one characteristic may yield significant results for a cruise port that satisfies a range of conditions but may turn up to be rather ineffective for cruise ports where critical internal and external attributes are considered as not satisfactory for homeporting.

Despite the quite successful fitting of the model, its results could not be considered as a full representation of the way that cruise ports' internal and external environment shape their potential of attracting homeport traffic. Different modifications regarding the model and the used variables may improve the validity of results and allow the smoother adaptation of the framework to other markets such as the Caribbean, Northern Europe and Asia. Cruise port characteristics captured by the empirical research should be evaluated in more detail so as to exactly correspond to the cruise port market assessed each time. Additionally, a more detailed estimation and assessment of efficiency, taking into account additional factors and based on different efficiency estimation techniques can certainly constitute a future research challenge.

Moreover, the effect of the different types of private terminal operators that was not examined here should also be extensively analyzed in similar future efforts. The inclusion of several other attributes such as port tariff policies, priority agreements and the specialization of ports in cruise traffic would possibly help to derive a more comprehensive picture about the way that internal port environment affects its development prospects. Additional variables may also be added to describe the external environment of cruise ports. The political conditions, the road and rail connectivity levels, the different national and policy frameworks should also be incorporated into the analysis. Finally, a crucial aspect regarding the time coverage of the present analysis should also be pointed out. The cross-sectional character of the used model may outweigh panel data models in terms of functionality but still can only be regarded as a snapshot of the cruise industry. Thus, a framework entailing longitudinal observations may result in acquiring more comprehensive results about the factors affecting homeport traffic.

Note

1. As some ports do not have a dedicated terminal for cruise activities, a small positive number is added to all observations of the terminal variable to overcome the fact that the proposed DEA model cannot accommodate zero inputs. This strategy is testified as efficient in the relevant to DEA literature (Bowlin, 1998).

References

Andriotis, K. and Agiomirgianakis, G. (2010), "Cruise visitors' experience in a Mediterranean port of call", *International Journal of Tourism Research*, Vol. 12 No. 4, pp. 390-404.

Blas, S.S. and Carvajal-Trujillo, E. (2014), "Cruise passengers' experiences in a Mediterranean port of call: the case study of Valencia", *Ocean & Coastal Management*, Vol. 102, pp. 307-316.

Bowlin, W.F. (1998), "Measuring performance: An introduction to data envelopment analysis (DEA)", *The Journal of Cost Analysis*, Vol. 15 No. 2, pp. 3-27.

Brida, J.G., Pulina, M., Riaño, E. and Aguirre, S.Z. (2012), "Cruise passengers' experience embarking in a Caribbean home port: the case study of Cartagena de Indias", *Ocean & Coastal Management*, Vol. 55 No. 1, pp. 135-145.

Brida, J.G., Pulina, M., Riaño, E. and Aguirre, S.Z. (2013), "Cruise passengers in a homeport: a market analysis", *Tourism Geographies*, Vol. 15 No. 1, pp. 68-87.

Brooks, M.R., Schellinck, T. and Pallis, A.A. (2011), "A systematic approach of evaluating port effectiveness", *Maritime Policy and Management*, Vol. 38 No. 3, pp. 315-334.

Castillo-Manzano, J.I., Fageda, X. and Gonzalez-Laxe, F. (2014), "An analysis of the determinants of cruise traffic: an empirical application to the Spanish port system", *Transportation Research Part E: Logistics and Transportation Review*, Vol. 66 No. 3, pp. 115-125.

Celebrity Cruise (2015), "E-Brochure – Europe", Celebrity Cruises, available at: http://viewer.zmags.com/publication/6ad0b3e8#/6ad0b3e8/1 (accessed 5 November 2015).

Cruise Critic (2011), "Cruise critic", available at: www.cruisecritic.com/ (accessed 3 December 2012).

Cruise Lines International Association – CLIA (2015), "Contribution of Cruise tourism to the economies of Europe - 2015 edition", available at: www.cruiseexperts.org/media/2280/clia-contribution-of-cruise-tourism-to-the-economies-of-europe-2015-report.pdf (accessed 30 December 2015).

Cruise Market Watch (2016), "Growth of the cruise line industry", *Cruise Market Watch*, available at: www.cruisemarketwatch.com/growth/ (accessed 24 March 2016).

Di Vaio, A., Medda, F. and Trujillo, L. (2011), "An analysis of the efficiency of Italian cruise terminals", *International Journal of Transport Economics*, Vol. 38 No. 1, pp. 29-46.

Esteve-Perez, J. and Garcia-Sanchez, A. (2015), "Cruise market: Stakeholders and the role of ports and tourist hinterlands", *Maritime Economics & Logistics*, Vol. 17 No. 3, pp. 371-388.

Eurostat (2013), "Eurostat", available at: http://ec.europa.eu/eurostat/data/database, (accessed 14 November 2014).

Gabe, T., Collen, L. and McConnon, J. (2006), "Likelihood of cruise ship passenger return to a visited Port: the case of Bar Harbor, ME", *Journal of Travel Research*, Vol. 44 No. 3, pp. 281-287.

Gui, L. and Russo, A.P. (2011), "Cruise ports: a strategic nexus between regions and global lines – evidence from the Mediterranean", *Maritime Policy & Management*, Vol. 38 No. 2, pp. 129-150.

Henthorne, T.L. (2000), "An analysis of expenditures by cruise ship passengers in Jamaica", *Journal of Travel Research*, Vol. 38 No. 3, pp. 246-250.

Hung, K. and Petrick, J.F. (2011), "Why do you cruise? Exploring the motivations for taking cruise holidays, and the construction of a cruising motivation scale", *Tourism Management*, Vol. 32 No. 2, pp. 386-393.

Kim, K., Hallab, Z. and Kim, J.N. (2012), "The moderating effect of travel experience in a destination on the relationship between the destination image and the intention to revisit", *Journal of Hospitality Marketing & Management*, Vol. 21 No. 5, pp. 486-505.

Lee, C.C. and Chang, C.P. (2008), "Tourism development and economic growth: a closer look at panels", *Tourism Management*, Vol. 29 No. 1, pp. 180-192.

Lekakou, M.B., Pallis, A.A. and Vaggelas, G.K. (2009), "Which homeport in Europe: the cruise industry's selection criteria", *Tourismos: An International Multidisciplinary Journal of Tourism*, Vol. 4 No. 4, pp. 215-240.

McCalla, R.J. (1998), "An investigation into site and situation: Cruise ship ports", *Tijdschrift voor economische en sociale geografie*, Vol. 89 No. 1, pp. 44-55.

Ma, M.Z., Fan, H.M. and Zhang, E.Y. (2015), "Cruise homeport location selection evaluation based on grey-cloud clustering model", *Current Issues in Tourism*, pp. 1-27.

MedCruise (2011), "The new MedCruise statistic report: 2nd ed., Costa brava cruise ports", available at: www.costabravacruiseports.com/wp-content/uploads/2012/09/MedCruise_Statistic-Report-2011_Port-of-Palamos.pdf, (accessed 3 September 2015).

MedCruise (2014), "Cruise activities in MedCruise ports: statistics 2013", *Med Cruise*, available at: www.medcruise.com/images/VariousDocs/Cruise_Activities_in_MedCruise_Ports_2014.pdf, (Accessed 5 August 2015).

MedCruise (2016), *Cruise Activities in Medcruise Ports: Statistics 2015, in* Pallis, A.A., Arapi, K. and Papachristou, A. (Eds), Med Cruise, Piraeus.

Minetos, D. and Polyzos, S. (2010), "Deforestation processes in Greece: a spatial analysis by using an ordinal regression model", *Forest Policy and Economics*, Vol. 12 No. 6, pp. 457-472.

Miriela, C.G.L. and Lennie, P. (2010), "Cruise tourists returning to curacao for a land-based vacation: a logit model", The University of West Indies, available at: http://sta.uwi.edu/conferences/09/salises/documents/L.%20Pau.pdf, (accessed 10 October 2015).

Niavis, S. and Tsekeris, T. (2012), "Ranking and causes of inefficiency of container seaports in South-Eastern Europe", *European Transport Research Review*, Vol. 4 No. 4, pp. 235-244.

Norusis, M. (2004), *SPSS 13.0 Statistical Procedures Companion*, Prentice Hall Publications, New Jersey.

Notteboom, T., Pallis, A. and Farrell, S. (2012), "Terminal concessions in seaports revisited", *Maritime Policy & Management*, Vol. 39 No. 1, pp. 1-5.

O'Connell, A.A. (2006), *Logistic Regression Models for Ordinal Response Variables (No. 146*), Sage, California.

Odo Maritime & Cruise Business Review (2014), *Global Ocean Cruise Market Analysis and Forecast*, Odo Maritime, Eastbourne.

Pallis, T. (2015), "Cruise shipping and urban development: state of the art of the industry and cruise ports", *OECDiLibrary*, International Transport Forum Discussion Paper, available at: www.oecd-ilibrary.org/transport/cruise-shipping-and-urban-development_5jrvzrlw74nv-en, (accessed 12 December 2015).

Pranić, L., Marušić, Z. and Sever, I. (2013), "Cruise passengers' experiences in coastal destinations– floating "B&Bs" vs floating "resorts": a case of Croatia", *Ocean & Coastal Management*, Vol. 84, pp. 1-12.

Princess Cruises (2012), "The value of pre- and post-cruise vacation stays", *Princess Cruises*, available at: www.princess.com/cruise-tips-vacation-ideas/cruise-destinations/cruise-tips-advice-and-information/the-value-of-pre-and-post-cruise-vacation-stays.html#.VoPeqlJyyfJ, (accessed 5 September 2015).

Qu, H. and Ping, E.W.Y. (1999), "A service performance model of Hong Kong cruise travelers' motivation factors and satisfaction", *Tourism Management*, Vol. 20 No. 2, pp. 237-244.

Rodrigue, J.P. and Notteboom, T. (2013), "The geography of cruises: itineraries, not destinations", *Applied Geography*, Vol. 38 No. 1, pp. 31-42.

Silvestre, A., Santos, C.M. and Ramalho, C. (2008), "Satisfaction and behavioral intentions of cruise passengers visiting the Azores", *Tourism Economics*, Vol. 14 No. 1, pp. 169-184.

TripAdvisor (2011), "TripAdvisor", available at: www.tripadvisor.com, (accessed 3 January 2011).

Vaggelas, G.K. and Pallis, A.A. (2016), "Cruise as a parameter of blue growth – the case of Greece (in Greek)", in Kyvelou, S. (Ed.), *Marine Spatial Issues: The Marine Dimension of the Territorial Cohesion – Marine Planning – Sustainable Blue Growth*, Kritiki Publications, Athens, pp. 387-411.

Véronneau, S. and Roy, J. (2009), "Global service supply chains: an empirical study of current practices and challenges of a cruise line corporation", *Tourism Management*, Vol. 30 No. 1, pp. 128-139.

Wang, T.F., Cullinane, K. and Song, D.W. (2003), "Container port production efficiency: a comparative study of DEA and FDH approaches", *Journal of Eastern Asian Society for Transportation Studies*, Vol. 5 No. 1, pp. 698-713.

Wang, Y., Jung, K.A., Yeo, G.T. and Chou, C.C. (2014), "Selecting a cruise port of call location using the fuzzy-AHP method: a case study in East Asia", *Tourism Management*, Vol. 42 No. 1, pp. 262-270.

Weaver, A. (2005), "The McDonaldization thesis and cruise shipping", *Annals of Tourism Research*, Vol. 32 No. 2, pp. 346-366.

Corresponding author
Spyros Niavis can be contacted at: spniavis@uth.gr